



Kids and the Metaverse:

**What Parents, Policymakers, and
Companies Need to Know**

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What Parents, Policymakers, and Companies Need to Know

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Special thanks to Brittan Heller and Jeremy Bailenson for taking the time to share their expertise.

Executive Summary

You might not know what the metaverse is, but your kids are likely in it (or will be soon). In the past year, the metaverse has received a lot of media attention and corporate investment. For all the excitement around this network of immersive virtual experiences, little has been said about the potential dangers the metaverse might pose for kids. Common Sense has published this report to begin to identify these concerns. Drawing on interviews and research from some of the leading experts in virtual and augmented reality, the report lays out many of the potential harms children and teenagers will face as they engage with the metaverse. It also gives clear guidance on what companies, policymakers, and parents and caregivers can do to minimize these harms.

Meta-what?

The metaverse is a series of connected digital worlds in which users can interact through first-person avatars. Some enter it with virtual reality devices, but many use just a smartphone or computer screen. Every day, millions of children experience a corner of the metaverse through games like Roblox, Fortnite, and Minecraft. The metaverse is quickly populating with users of all ages, and companies are also setting up shop, buying digital real estate and designing ad campaigns. Metaverse platforms have imposed few rules in these new worlds. Most avatars roam innocently, playing, chatting, and creating, but others take advantage of the digital freedom and the young profile of users to perform inappropriate, harmful, and damaging acts. You have read about (or experienced) harassment in traditional online environments, like a forum or social media site. Now imagine that harassment with users wearing VR headsets, fully immersed in digital abuse.

There are at least three categories of harm we have found with respect to the metaverse and young people:

1. **Physiological dangers.** Navigating the metaverse through VR can induce nausea, eye strain, and other forms of "cybersickness" among kids. VR headsets can blind users to real-world obstacles.
2. **Privacy violations.** Platforms can collect children's nonverbal data as VR systems record facial and eye movements. The sensitive biometric information of young users could be exploited for commercial gain, allowing ad firms to use involuntary physical reactions to track and target their internal desires.
3. **False information and manipulation.** The metaverse's one-to-one, immersive conditions make it easier for bad actors to persuade, mislead, and manipulate. The deceptive possibilities of bots, "deepfakes," and AR-altered realities are daunting, especially for tweens, who will have trouble discerning what or who is real.

There are also two other categories of potential harm that need further exploration:

4. **Sexual content and abuse.** In the metaverse, young users can regularly come across virtual strip clubs, sexual grooming, simulated sex acts, and rape threats. Because VR is designed to immerse the entire body, abuse has the potential to be more traumatic, if and when it occurs, than in other online formats.
5. **Psychological risks.** Signs of a relationship exist between the VR technologies underlying the metaverse and addiction, increased aggression, and dissociation from reality.

To protect kids and teens in the metaverse, strong safeguards must be put in place:

- **Companies need to design VR devices and metaverse systems with children in mind.** That means kid-friendly headsets, effective safety mechanisms, and minimal, user-centric data collection practices.
- **Policymakers need to invest in VR and metaverse research, prevent platforms from manipulating children online, and enforce baseline privacy requirements.** Legislation that has already been proposed—CAMRA, KIDS, and COPPA 2.0, for example—could apply to the metaverse.
- **Parents need to jump into the metaverse alongside their kids, talk to them about metaverse experiences, and become informed metaverse consumers.** They don't need to know everything about the metaverse, but they should try to understand how their kids may engage with it.

The metaverse is a wild, understudied, and unregulated place. Whether it becomes a dystopia or utopia will largely depend on how seriously we take its potential harms, particularly for young people, and how quickly we act to prevent them.

I. The Metaverse and Kids

The metaverse has received significant attention over the past year. Media outlets have produced dozens of articles about it, and investors have poured millions of dollars into it. This frenzied activity comes even as it remains difficult to spell out what exactly the metaverse means. Trying to define the "metaverse" is like trying to define the "internet." The two terms, writes venture capitalist Matthew Ball, eventually may be used interchangeably: "They are digital worlds, devices, services, websites, etc. The internet is a wide set of protocols, technology, tubes, and languages, plus access devices and content and communication experiences atop them. Metaverse will be too."¹ If the metaverse lives up to its hype, it may one day even displace the internet.

For the purposes of this report, we use "metaverse" to refer to one standalone or many connected, live, immersive networks of avatar-based social interactions taking place through immersive technologies, including virtual reality (VR), augmented reality (AR), and mixed reality (MR) environments. Additionally, as the metaverse is not yet fully realized—pending advancements in nanotechnology, internet infrastructure, batteries, headset wearability, and other technical components that may take years to develop—we will base our report on the limited existing research on kids in VR and AR.

Metaverse components are typically operated by companies, involve interpersonal communication via speech, text, or avatar actions, and may be accessed through AR/VR devices or a computer/phone screen.² While cryptocurrencies and non-fungible tokens (NFTs) are certainly elements of the metaverse, our report focuses less on these "web3" building blocks and more on the virtual-social experiences made possible in globally integrated, physically immersive digital environments.

Why write a report on the metaverse's possible harms to young people? For one thing, more and more young people are engaging with early components of the metaverse every day. Five years ago, 70% of U.S. children from 8 to 15 years old were either "extremely" or "fairly" interested in experiencing VR.³ In Common Sense's "[Virtual Reality 101](#)" report, we found that 21% of parents reported living in a household with a VR device in 2018.⁴ In a forthcoming report from Common Sense, 17% of U.S. children age 8 to 18 report having a VR headset, about one in five tweens (22%) and one in four teens (27%) have ever tried virtual reality, 3% of teens say they use VR every day, and 13% of tweens and teens say they enjoy using virtual reality "a lot" or "somewhat."⁵

And VR is just one way to engage with the metaverse. Millions of children also use non-immersive gaming systems (a traditional console or desktop computer, for instance) to join connected virtual worlds like those of Roblox, a platform that reported over 100 million monthly users under 13 years old in 2021.⁶ Other popular proto-metaverse platforms include Fortnite, Minecraft, AltspaceVR, Rec Room, and VRChat.

¹ Ball, M. (2020). *The metaverse: What it is, where to find it, and who will build it*. <https://www.matthewball.vc/all/themetaverse>.

² Woods, L., & Perrin, W. (2022). *Regulating the future: the Online Safety Bill and the metaverse*. Carnegie UK Trust. <https://www.carnegieuktrust.org.uk/blog-posts/regulating-the-future-the-online-safety-bill-and-the-metaverse/>.

³ Aubrey, J. S., Robb, M. B., Bailey, J., & Bailenson, J. (2018). *Virtual reality 101: What you need to know about kids and VR*. Common Sense. https://www.common Sense Media.org/sites/default/files/research/report/csm_vr101_final_under5mb.pdf.

⁴ Ibid.

⁵ Rideout, V., Peebles, A., Mann, S., & Robb, M. B. (2022). *Common Sense census: Media use by tweens and teens, 2021*. Common Sense.

⁶ Dean, B. (2022). *Roblox user and growth stats 2022*. Backlinko. <https://backlinko.com/roblox-users#roblox-monthly-active-users>.

The potential youth applications of these increasingly sophisticated platforms are clear. In addition to gaming and entertainment, the metaverse will likely become a tool for medical research and treatment (including pain management and rehabilitation), emotional and empathy training, and education. Students will take field trips to cultural landmarks thousands of miles away and historical eras thousands of years back. Millions of young people already visit proto-metaverse spaces to communicate with each other, and there is reason to believe these social spaces will become even more popular. Young people could one day spend most of their time in these digital worlds: After an immersive trip to ancient Greece on a rainy Tuesday, teens may practice drills with their soccer teams through VR headsets before jumping over to a virtual shopping mall to hang out with friends.

More research has been performed on the potentially beneficial uses of the metaverse than on its potentially harmful consequences. This report aims to help fill this gap by reviewing some of the possible harms that children and teens may face when in the metaverse. We present these harms along five themes: physiological dangers, privacy violations, false information and manipulation, sexual content and abuse, and psychological risks.

After laying out the existing research and unanswered questions for each section, we provide a few recommendations about what companies, policymakers, and parents can do to mitigate negative metaverse outcomes for kids. The report will be useful to members of these groups and anyone interested in protecting young people as they dive further into digital scenarios that become more extensive, complex, and "real" by the minute.

II. Harms to Kids and Teens in the Metaverse

A. Physiological Dangers

"Cybersickness" describes the motion sickness that can occur while experiencing VR.⁷ It can present as nausea, dizziness, disorientation, or the loss of spatial awareness. To explain this side effect, researchers typically reference the "sensory conflict" or "sensory mismatch" theory, a discrepancy between information sent to the eyes and to the inner ears.⁸ Strapping on a VR headset and walking, climbing, or falling through certain immersive environments, which are hyperreal but often lag and freeze "like a cellphone conversation that is constantly marred by delay,"⁹ can induce nausea similar to sickness felt in the back seat of a moving car. Researchers have found that VR headsets can simulate a wider "field of view" (how far the eyes see), which could increase the likelihood of cybersickness.¹⁰

Accessing the metaverse through VR headsets can also hurt a user's eyes. Staring at virtual scenarios (or any digital devices) for prolonged periods can cause eye strain and fatigue because people blink less when using screens, causing their eye surfaces to dry out. Unlike in the real world, where our eyes can change the focus of an image by changing shape, in VR, an image's focus level is set by the headset designer. These fixed accommodation rates can cause eye strain and fatigue for users.

Whether this eye strain could lead to more permanent damage is an open question. Researchers have not yet found a clear link between VR usage and vision deterioration. Still, there is anecdotal evidence that extensive VR use can contribute to vision loss,¹¹ and the recent development of VR technologies has made it difficult to study their long-term effects. Experts are clear that these potential consequences, which are not yet understood, cannot be ruled out.¹² In the long run, sensory mismatch through VR headsets might be particularly harmful for young users, whose brains are still in development.

One final physiological risk associated with VR and the metaverse involves the potentially traumatic collision between virtual and real worlds. When using VR headsets, users are fully immersed in digital scenarios that typically have no connection to their physical surroundings, whether they are in a room, at a park, or on the street. While wearing these headsets, children navigate the physical world blindfolded, putting them at risk of knocking into friends, tripping over pets, or falling onto sharp edges. VR expert Jeremy Bailenson identifies this risk category as "distraction": "You've got the goggles on, and you step on the cat, or you walk into a plate-glass window, or, God forbid, you're driving while doing VR. And people will drive while doing VR, because they do that

⁷ U.K. Department for Business, Energy & Industrial Strategy. (2020). *The safety of domestic virtual reality systems: A literature review*. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/923616/safety-domestic-vr-systems.pdf.

⁸ Barrett, J. (2004). *Side effects of virtual environments: A review of the literature*. No. DSTO-TR-1419. Defence Science and Technology Organisation Canberra (Australia). <https://apps.dtic.mil/sti/citations/ADA426109>.

⁹ Bailenson, J. (2018). *Experience on demand: What virtual reality is, how it works, and what it can do*. W.W. Norton & Company, Inc., 68.

¹⁰ So, R. H. Y., & Lo, W. T. Cyber sickness with virtual reality training applications: a claustrophobia phenomenon with head-mounted displays. *Proceedings of the first world congress on ergonomics for global quality and productivity* (1998): 209–212.

¹¹ (2020). *Developer warns VR headset damaged eyesight*. BBC News. <https://www.bbc.com/news/technology-52992675>; Heller, B. (2020). *Reimagining reality: Human rights and immersive technology*. Carr Center for Human Rights Policy, Harvard Kennedy School, Spring 2020(8). https://carrcenter.hks.harvard.edu/files/cchr/files/ccdp_2020-008_brittanheller.pdf, 19.

¹² McKie, R. (2017). *Virtual reality headsets could put children's health at risk*. The Guardian. <https://www.theguardian.com/technology/2017/oct/28/virtual-reality-headset-children-cognitive-problems>; Mon-Williams, M. (2017). *Is virtual reality bad for our health? The risks and opportunities of a technology revolution*. University of Leeds, via Medium. <https://medium.com/university-of-leeds/is-virtual-reality-bad-for-our-health-the-risks-andopportunities-of-a-technology-revolution-31520e50820a>.

with Pokémon Go. They've already done it with [augmented reality]."¹³ The idea of people in headsets running into walls may seem comically far-fetched, but it may be the metaverse's most significant—or, at least, most immediate—harm: "Physical contact while distracted is my number one concern for VR and people," says Bailenson.¹⁴

B. Privacy Violations

Another potential area of harm regarding the metaverse involves privacy. AR/VR technologies and the metaverse facilitate an increasing overlap between online and offline worlds, which exacerbates existing digital privacy concerns. Headsets amplify a user's ability to project personal information into the digital realm, and the metaverse amplifies a company's ability to share that information across digital spaces (and make money doing so).

In the metaverse, large platforms will likely continue the data collection practices that helped them amass huge profits through the two-dimensional internet. Meta (formerly Facebook) has made it clear in interviews and public filings that personalized advertisements will be central to its metaverse business model. Recent Meta patents lay out technologies to track eyes through headset sensors, adapt content based on facial expressions, and let third parties sponsor objects in virtual stores.¹⁵ Through these and other systems, Meta will be able to track users' movements, behaviors, and interests with unprecedented specificity on platforms like Horizon Worlds, which already hosts over 300,000 people.¹⁶

Big Tech's management of personal information has always been a [cause for concern](#), especially with respect to the sensitive information of young users. Unfortunately, the metaverse opens up a massive new scale of data tracking. VR devices contain cameras and sensors that constantly record user movements. Commercial VR technology is able to track body movements 90 times per second, and sophisticated systems can track 18 distinct movement categories across the head and hands.¹⁷ Eye trackers can measure a wide range of details, including blink duration, gaze fixation, dryness, pupil dilation, and iris texture.¹⁸ The result of this abundant, intimate tracking? "Spending 20 minutes in a VR simulation leaves just under 2 million unique recordings of body language," writes Jeremy Bailenson.¹⁹

Researchers have shown how, taken together, the millions of data points collected through VR technology create a "motion signature" that can be used to identify individuals with striking speed and precision—greater than 95% accuracy after just a few minutes.²⁰ Companies will make algorithms that use this nonverbal data to surveil individuals across the metaverse with even more totality than with their non-metaverse predecessors. A young

¹³ Heller, B. (2022, February 16). Personal communication.

¹⁴ Ibid.

¹⁵ Murphy, H. (2022). Facebook patents reveal how it intends to cash in on metaverse. *Financial Times*. <https://www.ft.com/content/76d40aac-034e-4e0b-95eb-c5d34146f647>.

¹⁶ Heath, A. (2022). Meta's social VR platform Horizon hits 300,000 users. *The Verge*. <https://www.theverge.com/2022/2/17/22939297/meta-social-vr-platform-horizon-300000-users>.

¹⁷ Bailenson, J. (2018). Protecting nonverbal data tracked in virtual reality. *JAMA Pediatrics*. doi:10.1001/jamapediatrics.2018.1909.

¹⁸ Kröger, J. L., Lutz, O. H., & Müller, F. (2020). What does your gaze reveal about you? On the privacy implications of eye tracking. In: Friedewald, M., Önen, M., Lievens, E., Krenn, S., & Fricker, S. (eds.) *Privacy and Identity Management. Data for Better Living: AI and Privacy. Privacy and Identity 2019. IFIP Advances in Information and Communication Technology*, 576. Springer, Cham. https://doi.org/10.1007/978-3-030-42504-3_15, 228.

¹⁹ Bailenson, J. (2018). Protecting nonverbal data tracked in virtual reality. *JAMA Pediatrics*. <https://stanfordvr.com/mm/2018/08/bailenson-jamap-protecting-nonverbal.pdf>.

²⁰ Miller, M. R., Herrera, F., Jun, H., Landay, J., & Bailenson, J. (2020). Personal identifiability of user tracking data during observation of 360-degree VR video. *Sci Rep* 10, 17404. <https://doi.org/10.1038/s41598-020-74486-y>.

girl may take precautions to avoid using her name or revealing personal information, but her smile alone will give platforms more than enough to follow her through the metaverse and note her emotional responses to stimuli.

Metaverse platforms will also be able to take advantage of what Brittan Heller calls "biometric psychography," a merging of bodily information, identity, and interests.²¹ It turns out that eye and face movements can be analyzed not just to identify people, but also to reveal their behavior and desires. Eye tracking and pupil dilation can potentially signal personality traits, cultural affiliation, skills, preferences, and aversions.²² In some cases just three seconds is enough time for eye-tracking technologies to provide a strong prediction of human decisions.²³ Beyond eye tracking, companies can measure users' heart rates, muscle tension, micro facial expressions, brain activity, and gait, or walking style, which, in combination with head tilt, is as personally identifiable as fingerprints, retinas, and vocal patterns.²⁴

Heller believes that advertisers will turn to these body-oriented behavioral prediction systems to target customers. Platforms will sell advertisers detailed consumer profiles, with motion signatures revealing information as personal as one's phobias or sexual orientation. "My nightmare scenario," explains Heller, "is that targeted advertising based on our involuntary biological reactions to stimuli is going to start showing up in the metaverse ... most people don't realize how valuable that could be. Right now there are no legal constraints on that."²⁵

Indeed, without clear restrictions on how companies can track users and what they can do with personal data, the metaverse will be riddled with privacy violations. Given the complex nature, diverse categories, and vast quantity of information recorded through VR/AR tracking, users will often have little understanding of what exactly is being measured when they enter the metaverse. Obtaining fair, informed consent from users with respect to their data will be difficult, to say the least. Furthermore, even with consent, companies may mishandle acutely sensitive information, especially as they seek to integrate other parties, services, and developers into their metaverse platforms. These concerns will be particularly pronounced for young users, whose understanding of the metaverse and privacy rights will be even less comprehensive than that of adults.

As with all digital services, children and teens in the metaverse are at risk of oversharing sensitive information. The metaverse's new harms relate to the heightened intimacy and expanded quantity of information that can be measured through VR/AR technologies. By tracing eye movements, facial expressions, and body postures, companies will be able to pick up on young people's personal desires, mental health, and long-term health prospects. They will have an incentive to exploit private moments for profit, and, with still-developing brains, kids and teens will be particularly vulnerable to such commercial exploitation.

²¹ Heller, B. (2020). *Reimagining reality: Human rights and immersive technology*. Carr Center for Human Rights Policy, Harvard Kennedy School, Spring 2020(8). https://carrcenter.hks.harvard.edu/files/cchr/files/ccdp_2020-008_brittanheller.pdf.

²² Kröger, J. L., Lutz, O. H., & Müller, F. (2020). What does your gaze reveal about you? On the privacy implications of eye tracking. In: Friedewald, M., Önen, M., Lievens, E., Krenn, S., & Fricker, S. (eds.) *Privacy and Identity Management. Data for Better Living: AI and Privacy. Privacy and Identity 2019. IFIP Advances in Information and Communication Technology*, 576. Springer, Cham. https://doi.org/10.1007/978-3-030-42504-3_15, 228.

²³ Guazzini, A., Yoneki, E., & Gronchi, G. (2015). Cognitive dissonance and social influence effects on preference judgments: An eye tracking based system for their automatic assessment. *International Journal of Human-Computer Studies*, 73 (2015), 12–18. <https://doi.org/10.1016/j.ijhcs.2014.08.003>.

²⁴ Heller, B. (2020). *Reimagining reality: Human rights and immersive technology*. Carr Center for Human Rights Policy, Harvard Kennedy School, Spring 2020(8). https://carrcenter.hks.harvard.edu/files/cchr/files/ccdp_2020-008_brittanheller.pdf.

²⁵ Murphy, H. (2022). Facebook patents reveal how it intends to cash in on metaverse. *Financial Times*. <https://www.ft.com/content/76d40aac-034e-4e0b-95eb-c5d34146f647>.

Kids do not understand how they are unconsciously "signing" Big Tech's advertising checks simply by moving with a headset on, and their psychological development (not to mention human dignity) will suffer: They will experience the commodification of previously guarded, internal ideas, or will suffer from self-censorship as they try to obscure their feelings and reactions to prevent such processes.²⁶

C. False Information and Manipulation

Social media is inundated with false information. Disinformation, misinformation, and conspiracies flow between smaller platforms (e.g., Reddit, Discord), messaging platforms (e.g., WhatsApp, Signal), and mainstream platforms (e.g., Facebook, YouTube, TikTok). Some argue that VR does not facilitate the viral spread of false information due to its design limitations on reach—that VR is a "one-to-one" or "one-to-few" platform, while much of social media enables "one-to-many" communication. Unfortunately, this perspective disregards the anonymity and other persuasive advantages of avatars in the metaverse, as well as the metaverse's many private spaces in which conspiracy theorists and extremists can convene and convert new members.

The anonymity of virtual avatars can further facilitate the trolling that afflicts social media, falsely inflating the popularity of ideas, goods, and individuals, and allowing the mass coordination of harassment and censorship campaigns, among other problematic behaviors.²⁷ While not widely prevalent now, virtual troll armies will be easy to coordinate in private VR rooms, and their threats will feel all the more intimidating in 3D. Additionally, due to lax registration credentials and advancements in artificial intelligence, VR bot accounts are likely to become more widespread, making it difficult for users to know if they're engaging with a real person or computer code.

As for persuasion, VR experiences have been shown to be more integrated in autobiographical memory than 2D video²⁸ and to lead to the creation of false memories in kids.²⁹ Beyond memory, the influence of avatars on users' self-perception and offline behavior is well documented, both in terms of the virtual form one takes and the forms of avatars one interacts with.³⁰ Research shows that when users are able to customize the avatar of a salesperson, they are more likely to purchase the product being sold.³¹ Given that we are attracted to individuals who look like us and people we trust,³² avatars that replicate facial features, body posture, and other intimate traits—data that is collected en masse by VR and AR devices and that can be sold to advertisers without restraint due to a lack of regulation—are anticipated to be especially persuasive. Furthermore, due to inadequate regulation regarding ownership of one's own image, "deepfakes"—realistic-looking synthetic images and videos created by deep learning artificial intelligence—could become even more compelling in the 3D world of VR and be used for persuasion.³³

²⁶ Heller, B. (2020). *Reimagining reality: Human rights and immersive technology*. Carr Center for Human Rights Policy, Harvard Kennedy School, Spring 2020(8). https://carrcenter.hks.harvard.edu/files/cchr/files/ccdp_2020-008_brittanheller.pdf, 19.

²⁷ Bradshaw, S., & Howard, P. (2017). *Troops, trolls, and troublemakers: A global inventory of organized social media manipulation*. Computational Propaganda Research Project. Oxford Internet Institute. <http://governance40.com/wp-content/uploads/2018/11/Troops-Trolls-and-Troublemakers.pdf>.

²⁸ Schöne, B., Wessels, M., & Gruber, T. (2019). Experiences in virtual reality: A window to autobiographical memory. *Current Psychology*, 38(3), 715–719. <https://link.springer.com/article/10.1007/s12144-017-9648-y>.

²⁹ Segovia, K. Y., & Bailenson, J. N. (2009). Virtually true: Children's acquisition of false memories in virtual reality. *Media Psychology*, 12(4), 371–393. <https://stanfordvr.com/mm/2009/segovia-virtually-true.pdf>.

³⁰ Yee, N., Bailenson, J. N., & Ducheneaut, N. (2009). The proteus effect: Implications of transformed digital self-representation on online and offline behavior. *Communication Research*, 36(2), 285–312. <https://doi.org/10.1177/0265093650208330254>.

³¹ Hanus, M. D., & Fox, J. (2015). Persuasive avatars: The effects of customizing a virtual salesperson's appearance on brand liking and purchase intentions. *International Journal of Human-Computer Studies*, 84, 33–40. <https://doi.org/10.1016/j.ijhcs.2015.07.004>.

³² Montoya, R. M., Horton, R. S., & Kirchner, J. (2008). Is actual similarity necessary for attraction? A meta-analysis of actual and perceived similarity. *Journal of Social and Personal Relationships*, 25(6), 889–922. <https://doi.org/10.1177/0265407508096700>.

³³ Kalpokas, I. (2021). Problematising reality: the promises and perils of synthetic media. *SN Social Sciences*, 1(1), 1–11. <https://doi.org/10.1007/s43545-020-00010-8>.

Extremists, including terrorists and far-right groups, have proved extremely adept at utilizing social media for recruitment and coordination. Far-right and terrorist groups have targeted young people with coordinated meme campaigns, invitations to private chat rooms, and through influencers who gradually introduce extremist content, often starting with innocuous topics like video games or fashion, among other techniques.³⁴ Neo-Nazis, white supremacists, and others have specific tactics for recruiting youths within video games and on streaming platforms like Steam, exploiting the norm of bonding with strangers through gaming and targeting youths who are drawn to extreme violence.³⁵ Considering that bonding with strangers and interactions in private rooms are central to virtual spaces, it appears that extremist recruitment of youth could be even easier in the metaverse. Also, given the malleability of VR rooms, with sufficient information, terrorists could model attack targets and test contingency plans.³⁶

Augmented reality (AR), which consists of visual, auditory, and/or touch-based digital overlays of one's real-world perceptions, will also play a primary role in the metaverse. The opportunities for manipulation are broad. In virtual reality, the headset and total scene fabrication signal that one is in an altered environment. In AR, reality and fabrication are blurred with the intention of seamless integration. There will need to be clear demarcation of what is digitally rendered in a user's visual field, and clear communication about what has been removed, as well as the parameters justifying removal.³⁷

Who will decide which elements of reality are displayed and which are deleted? Just as there is political power in content ranking and censorship on social media, there is arguably greater power in the manipulation of individuals' lived experiences. In an experiment testing this concept, garbage and signs of homelessness were removed from scenes of Hawaii.³⁸ One could imagine such manipulations applied through AR to real-time experiences of political unrest or hate crimes, shaping public opinion and witness testimony from the moment of perception.

Areas of Potential Harm That Require More Research

While the harms related to privacy, physiology, and false information are fairly clear, there are other areas of potential harm that require exploration and understanding before kids begin engaging with the metaverse. Below are a few areas of concern that need more research.

D. Sexual Content and Abuse

Sexual harassment, bullying, and other forms of abuse are rampant online. A global study from 2021 found that 34% of respondents had been asked to do something sexually explicit online during childhood.³⁹ Another analysis found there to be a 77% increase in child "self-generated" sexual material from 2019 to 2020, 80% of which came

³⁴ Lewis, R. (2018). *Alternative influence: Broadcasting the reactionary right on YouTube*. Data & Society Research Institute. <https://datasociety.net/library/alternative-influence/>; Alava, S., Frau-Meigs, D., & Hassan, G. (2017). *Youth and violent extremism on social media: mapping the research*. UNESCO Publishing. <https://unesdoc.unesco.org/ark:/48223/pf0000260382>.

³⁵ Dino, D. (2019). *E-Recruits: How gaming is helping terrorist groups radicalize and recruit a generation of online gamers*. Concentric. <https://www.concentric.io/blog/e-recruits-how-gaming-is-helping-terrorist-groups-radicalize-and-recruit-a-generation-of-online-gamers>.

³⁶ Elson, J. S., Doctor, A. C., & Hunter, S. (2022). *The metaverse offers a future full of potential—for terrorists and extremists, too*. The Conversation. <https://theconversation.com/the-metaverse-offers-a-future-full-of-potential-for-terrorists-and-extremists-too-173622>.

³⁷ Rosa, A. (2013). Occlusive Reality. *Journal of Futures Studies*, 17(3), 141–144. <https://jfsdigital.org/articles-and-essays/2013-2/vol-17-no-3-march-2013/symposium/occlusive-reality/>.

³⁸ Ibid.

³⁹ Setter, C., Greene, N., Newman, N., & Perry, J. (2021). *Global threat assessment 2021*. WeProtect Global Alliance. <https://www.weprotect.org/global-threat-assessment-21/>.

from girls age 11 to 13.⁴⁰ As for cyberbullying, a 2019 study found that 37% of American young people age 12 to 17 have experienced bullying online.⁴¹ Unfortunately, children rarely talk to adults about the abuse they face. According to a 2019 survey conducted by Roblox, only 26% of teens said they would talk to their parents about negative online experiences like bullying.⁴² In a 2021 analysis, only 12% of minors who received sexual messages or requests for nude images from adults reported these interactions to a parent, caregiver, or other trusted adult.⁴³ Furthermore, only 6% of minors reported telling a trusted adult if another adult sent them a nude image or video.⁴⁴

VR headsets engulf our eyes and ears, altering sight and sound. Haptic gloves and vests, which relay sensations through vibrations, make virtual touches more realistic. As a result, "[a] VR experience is often better understood *not as a media experience, but as an actual experience*, with the attendant results for our behavior."⁴⁵ Feelings of presence and body ownership create a sensation of "realness" that can cause users to respond with real fear, physiologically and emotionally, when they see their virtual bodies being threatened.⁴⁶

There are no public, large-scale analyses of abuse in VR, AR, or immersive gaming, so we must rely on individual reports. Recently, a BBC researcher posed as a 13-year-old in VRChat—her real identity was not checked—and she witnessed simulated sex, grooming, racist slurs, and a rape threat, all with the possibility of children being present.⁴⁷ Other activists and researchers have similarly reported witnessing children being forced to engage in simulated sexual acts, as well as a 7-year-old girl encircled by men threatening to rape her.⁴⁸ And on the platform Roblox, users create short-lived virtual strip clubs and "condo games," where minors offer virtual dances and sexual acts, as well as nude photographs off-platform, to adults in exchange for "Robux," which can be converted into real money.⁴⁹

Sexual assault, particularly in the form of groping, is already an issue in VR.⁵⁰ In response to a recent sexual assault in Horizon Worlds, Meta (formerly Facebook) has introduced a default four-foot personal space boundary around users.⁵¹ Unfortunately, this is an imperfect intervention that does not prevent abuse from happening. Beyond sexual abuse, name-calling and "physical" assaults like punching are common in the metaverse.⁵² Later in this report, we will discuss ways in which companies can better prevent and mitigate these potential harms.

⁴⁰ (2020). IWF annual report 2020—Face the facts. Internet Watch Foundation. <https://www.iwf.org.uk/about-us/who-we-are/annual-report/>.

⁴¹ Patchin, J. (2019). 2019 Cyberbullying Data. Cyberbullying Research Center. <https://cyberbullying.org/2019-cyberbullying-data>.

⁴² (2019). 60% of teens rarely or never talk to their parents about appropriate online behavior, survey finds. Roblox. <https://corp.roblox.com/2019/11/60-teens-rarely-never-talk-parents-appropriate-online-behavior-survey-finds/>.

⁴³ (2021). Responding to online threats: Minors' perspectives on disclosing, reporting, and blocking. Thorn & Benenson Strategy Group. https://info.thorn.org/hubfs/Research/Responding%20to%20Online%20Threats_2021-Full-Report.pdf.

⁴⁴ Ibid.

⁴⁵ Bailenson, J. (2018). *Experience on demand: What virtual reality is, how it works, and what it can do*. W.W. Norton & Company, Inc., 46.

⁴⁶ Petkova, V. I., Khoshnevis, M., & Ehrsson, H. H. (2011). The perspective matters! Multisensory integration in ego-centric reference frames determines full-body ownership. *Frontiers in Psychology*, 2, 35. <https://doi.org/10.3389/fpsyg.2011.00035>.

⁴⁷ Crawford, A., & Smith, T. (2022). Metaverse app allows kids into virtual strip clubs. BBC News. <https://www.bbc.com/news/technology-60415317>.

⁴⁸ Ibid.

⁴⁹ Dickson, E. J. (2021). Inside the underground strip-club scene on kid-friendly gaming site Roblox. *Rolling Stone*. <https://www.rollingstone.com/culture/culture-features/roblox-virtual-strip-clubs-condo-games-sex-1197237>.

⁵⁰ Basu, T. (2021). The metaverse has a groping problem already. *MIT Technology Review*. <https://www.technologyreview.com/2021/12/16/1042516/the-metaverse-has-a-groping-problem/>.

⁵¹ Milmo, D. (2022). Meta to bring in mandatory distances between virtual reality avatars. *The Guardian*. <https://www.theguardian.com/technology/2022/feb/04/meta-to-bring-in-mandatory-distances-between-virtual-reality-avatars>.

⁵² Wong, Q. (2021). As Facebook plans the metaverse, it struggles to combat harassment in VR. CNET. <https://www.cnet.com/tech/gaming/features/as-facebook-plans-the-metaverse-it-struggles-to-combat-harassment-in-vr/>.

E. Psychological Risks

As stated by Brittan Heller, "the metaverse isn't designed for young people."⁵³ Most headsets, including Samsung's Gear VR, Google's Daydream View, and Meta's Oculus Quest, are designed for ages 13 and older. Unfortunately, as with social media, age verification methods are woefully inadequate.⁵⁴ As a result, kids and their still-developing brains can be exposed to vivid, immersive content in virtual environments that are insufficiently moderated.⁵⁵ The potential mental health impacts are as wide-ranging as the experiences available in VR. Here, we will focus on areas to explore related to overuse and overexposure: addiction and problematic internet use, aggression, and dissociation.

1. Addiction and Problematic Internet Use

A recent survey found that 77% of respondents believe the metaverse will cause serious harm to society, and the biggest perceived harm was addiction to simulated reality.⁵⁶ A [poll](#) conducted by Common Sense found that 47% of parents believe their children are addicted to their phones, meaning that phones are getting in the way of things like family time, sleep, work, and school, for example.⁵⁷ As for video games, a precursor to the metaverse, research finds that problematic behaviors typically begin in early adolescence and often emerge among excessive users after episodes of stress, depression, and/or social isolation.⁵⁸ Disagreement still exists in the field about what video game disorder is and how it's measured, but Internet Gaming Disorder (IGD), which recognizes unhealthy patterns of engagement with games, is a condition of interest identified by the American Psychiatric Association. Mostly diagnosed in male adolescents and young adults, IGD is currently being considered for inclusion within the next version of the DSM-V. While there are a variety of estimates about the pervasiveness of video game disorder, a systematic review found the global prevalence of gaming disorder to be 3.05%, translating to an estimated 60 million people.⁵⁹ Addiction to gaming in virtual reality is far less studied.

Personality traits are also a strong predictor of problematic internet use (PIU). A meta-analysis found that people high in neuroticism and low in extraversion, agreeableness, and openness are more likely to engage in PIU.⁶⁰ PIU is also correlated with individuals who have avoidant, borderline, narcissistic, and schizoid personality disorders.⁶¹ In the case of individuals who exhibit schizotypal personality traits, such as paranoia, inappropriate affect, odd speech, and lack of close friends, among other traits, research has shown that the severity of their traits

⁵³ Heller, B. (2022, February 16). Personal communication.

⁵⁴ Pasquale, L., Zippo, P., Curley, C., O'Neill, B., & Mongiello, M. (2020). *Digital age of consent and age verification: Can they protect children?* IEEE Software. <https://lpasquale.github.io/papers/IEEESoftware.pdf>; Oremus, W. (2022). Kids are flocking to Facebook's 'metaverse.' Experts worry predators will follow. *Washington Post*.

<https://www.washingtonpost.com/technology/2022/02/07/facebook-metaverse-horizon-worlds-kids-safety/>.

⁵⁵ Baker-White, E. (2022). *Meta wouldn't tell us how it enforces its rules in VR, so we ran a test to find out*. BuzzFeed.

<https://www.buzzfeednews.com/article/emilybakerwhite/meta-facebook-horizon-vr-content-rules-test>.

⁵⁶ Griffith, E. (2021). *Metaverse predictions: It will be harmful, addictive, and inevitable*. PCMag.

<https://www.pcmag.com/news/metaverse-predictions-it-will-be-harmful-addictive-and-inevitable>.

⁵⁷ Common Sense Media. (2018). *Common Sense and SurveyMonkey poll parents on YouTube and technology addiction*. [Press release].

<https://www.common Sense Media.org/press-releases/common-sense-and-surveymonkey-poll-parents-on-youtube-and-technology-addiction>.

⁵⁸ Griffiths, M. D., & Meredith, A. (2009). Videogame addiction and its treatment. *Journal of Contemporary Psychotherapy*, 39(4), 247–253.

<https://doi.org/10.1007/s10879-009-9118-4>.

⁵⁹ Stevens, M. W., Dorstyn, D., Delfabbro, P. H., & King, D. L. (2021). Global prevalence of gaming disorder: A systematic review and meta-analysis. *Australian & New Zealand Journal of Psychiatry*, 55(6), 553–568. <https://doi.org/10.1177/0004867420962851>.

⁶⁰ Kayış, A. R., Satıcı, S. A., Yılmaz, M. F., Şimşek, D., Ceyhan, E., & Bakioğlu, F. (2016). Big five-personality trait and internet addiction: A meta-analytic review. *Computers in Human Behavior*, 63, 35–40. <https://doi.org/10.1016/j.chb.2016.05.012>.

⁶¹ Schimmenti, A., Infantì, A., Badoud, D., Laloyaux, J., & Billieux, J. (2017). Schizotypal personality traits and problematic use of massively-multiplayer online role-playing games (MMORPGs). *Computers in Human Behavior*, 74, 286–293.

<https://doi.org/10.1016/j.chb.2017.04.048>.

diminishes in the virtual world, enabling greater social connection, which is likely why such individuals spend so much time online.⁶²

It is important to understand which populations are likely to be heavy users of the metaverse, so that steps can be taken to support users of the metaverse who bring preexisting conditions into the metaverse and, as a result, are most at risk for possible addiction and the impacts of problematic use.

2. Aggression

Excessive exposure to violent media has been found to be a risk factor for violent behavior among children.⁶³ Similarly, violent video games, which enable kids to enact violence themselves, may increase the risk of aggression for some children in the near future and the risk of aggressive behavior later in life.⁶⁴ The effect is found across girls and boys from countries around the world.⁶⁵ Other studies have found that the short-term impact of video game violence on increased aggression is partly due to in-game incentives, competitiveness, and emotional arousal.⁶⁶ In the long term, players are more likely to be desensitized to media violence, which correlates with decreased empathy in the real world.⁶⁷

When users commit violent acts in virtual reality, their bodies produce physiological stress responses, even in cases where they know the victim is an avatar controlled by computer code and not another human.⁶⁸ Participation in a negative event in VR intensifies negative emotions during gameplay, in comparison to participation in a negative event through a 2D video game, and the negative emotions persist even after the player has reentered the real world.⁶⁹ Interestingly, there have been more studies on the potential positive application of VR as a tool for violence prevention than studies on the potential harms. Embodying experiences of victims, perpetrators, and bystanders in VR can facilitate feelings of guilt, perspective-taking, and increased empathy for victims, all of which can enhance violence prevention.⁷⁰

⁶² Ibid.

⁶³ Anderson, C. A., Bushman, B. J., Bartholow, B. D., and Ybarra, M. (2017). Screen violence and youth behavior. *Pediatrics* 140, 142–147. <https://doi.org/10.1542/peds.2016-1758t>; (2013). *Media and violence: An analysis of current research*. Common Sense Media. <https://www.commonsensemedia.org/sites/default/files/research/report/media-and-violence-research-brief-2013.pdf>.

⁶⁴ Prescott, A. T., Sargent, J. D., and Hull, J. G. (2018). Metaanalysis of the relationship between violent video game play and physical aggression over time. *Proc. Natl. Acad. Sci. U.S.A.* 115, 9882–9888. <https://doi.org/10.1073/pnas.1611617114>; Huesmann, L. R. (2010). Nailing the coffin shut on doubts that violent video games stimulate aggression: comment on Anderson, et al. (2010).

⁶⁵ Ibid.

⁶⁶ Carnagey, N. L., & Anderson, C. A. (2005). The effects of reward and punishment in violent video games on aggressive affect, cognition, and behavior. *Psychological Science*, 16(11), 882–889. <https://doi.org/10.1111/j.1467-9280.2005.01632.x>; Fleming, M. J., & Rick Wood, D. J. (2001). Effects of violent versus nonviolent video games on children's arousal, aggressive mood, and positive mood. *Journal of Applied Social Psychology*, 31(10), 2047–2071. <https://doi.org/10.1111/j.1559-1816.2001.tb00163.x>.

⁶⁷ Carnagey, N. L., Anderson, C. A., & Bushman, B. J. (2007). The effect of video game violence on physiological desensitization to real-life violence. *Journal of Experimental Social Psychology*, 43(3), 489–496. <https://doi.org/10.1016/j.jesp.2006.05.003>; Funk, J. B., Buchman, D. D., Jenks, J., & Bechtoldt, H. (2003). Playing violent video games, desensitization, and moral evaluation in children. *Journal of Applied Developmental Psychology*, 24(4), 413–436. [https://doi.org/10.1016/S0193-3973\(03\)00073-X](https://doi.org/10.1016/S0193-3973(03)00073-X).

⁶⁸ Slater, M., Antley, A., Davison, A., Swapp, D., Guger, C., Barker, C., Pistrang, N., & Sanchez-Vives, M. V. (2006). A virtual reprise of the Stanley Milgram obedience experiments. *PLoS One*, 1(1), e39. <https://doi.org/10.1371/journal.pone.0000039>.

⁶⁹ Lavoie, R., Main, K., King, C., & King, D. (2021). Virtual experience, real consequences: The potential negative emotional consequences of virtual reality gameplay. *Virtual Reality*, 25(1), 69–81. <https://link.springer.com/article/10.1007/s10055-020-00440-y>.

⁷⁰ Bowman, N. D., Ahn, S. J., & Mercer Kollar, L. M. (2020). The paradox of interactive media: The potential for video games and virtual reality as tools for violence prevention. *Frontiers in communication*, 5, 104. <https://doi.org/10.3389/fcomm.2020.580965>.

F. Dissociation

For some children, video game playing is an avenue for escapism, but for other children, video gaming provides opportunities for positive mood management and social interaction with friends. "Derealization" occurs when an individual who is already at risk feels alienated and detached from reality, while "depersonalization" evokes feelings that one's body is not real. Both provoke feelings of lost agency and the sensation of "living in a dream."⁷¹ There is concern that "long-term immersion could cause damage to the neural mechanisms that create the feeling of reality, of being in immediate contact with the world and one's own body."⁷² A recent study found that participants felt sensations of derealization and depersonalization immediately after 30 minutes spent in VR, but the sensations did not persist, likely due to limited exposure time.⁷³ While these issues are certainly more urgent for those who are already at risk, we need to continue to explore how VR and the metaverse can exacerbate some of them.

III. Protecting Kids in the Metaverse

A. What Companies Can Do

Companies can take deliberate design steps to mitigate the harms that young people face in the metaverse. With respect to hardware, headsets that are intended to be used by children must be designed with children in mind. A gender imbalance in VR device design has already been shown, as many sets appear to be made primarily for adult males.⁷⁴ There is reason to believe that developers have also neglected the physical characteristics and needs of children. Headsets, for instance, often have an interpupillary distance (IPD) fixed to accommodate adult-size heads. This design flaw can make eye strain or fatigue more likely among young users. The ability to adjust IPD should be standard to accommodate all audiences. Alternatively, separate child and adult VR devices could be sold to adjust physical settings for different age groups.

Metaverse spaces themselves can also be designed to minimize harm to children. Of high importance is accurate age verification that does not violate user privacy. Additionally, developers should create certain default protections, including the ability to block or eject bad actors, and instantly create room copies without bad actors, quick and easy-to-use personal space and audio bubbles, and efficient reporting mechanisms. Developers should not limit access to metaverse experiences based on whether a user opts in to data collection.

Ideally, companies will support the implementation of self-sovereign identity or another decentralized identity system that standardizes a transparent, user-centric, consent-based protocol for user data.⁷⁵ By providing users with ownership and control over their own data, these systems empower users to make informed choices and, in turn, minimize the negative impact of manipulative and exploitive data use. Platforms should enable

⁷¹ Ibid.

⁷² Madary, M., & Metzinger, T. K. (2016). Real virtuality: a code of ethical conduct. Recommendations for good scientific practice and the consumers of VR-technology. *Frontiers in Robotics and AI*, 3, 3. <https://doi.org/10.3389/frobt.2016.00003>.

⁷³ Peckmann, C., Kannen, K., Pensel, M. C., Lux, S., Philipsen, A., & Braun, N. (2022). Virtual reality induces symptoms of depersonalization and derealization: A longitudinal randomised control trial. *Computers in Human Behavior*, 107233. <https://doi.org/10.1016/j.chb.2022.107233>.

⁷⁴ Robertson, A. (2016). *Building for virtual reality? Don't forget about women*. The Verge. <https://www.theverge.com/2016/1/11/10749932/vr-hardware-needs-to-fit-women-too>.

⁷⁵ Hamilton-Duffy, K., Grant, R., & Gropper, A. (2021). *Use cases and requirements for decentralized identifiers*. W3C Working Group. <https://www.w3.org/TR/did-use-cases/>.

interoperability⁷⁶ so that users can choose to move their data as they prefer.⁷⁷ When platform management or data policies change, all users should be asked to opt in again; consent should not be preauthorized through multiple iterations of a company's privacy policy.⁷⁸

If they fail to meet these standards, companies should, at the very least, set and follow tracking policies that minimize data collection. They could, for example, track fewer channels of data or eliminate data quickly after it has been utilized.⁷⁹ They should set terms-of-service agreements for immersive scenarios that go beyond the 2D content regulations currently implemented by traditional social media. "This is important," Brittan Heller stresses, "because platform governance in digital worlds must regulate *behavior*, in addition to content."⁸⁰

And throughout all of this—whether designing VR headsets, metaverse rooms, or data policies—companies should enlist the input and support of psychologists, children's rights advocates, and kids themselves from the beginning of development.⁸¹ They should prioritize the best interests of children when designing any product or service that will be used by children.

B. What Policymakers Can Do

The metaverse is here, and policymakers in the United States must take decisive action to protect the well-being of young users jumping into its complex, connected worlds. They should follow the lead of counterparts in Europe who have started reviewing the metaverse from regulatory perspectives.⁸² Any existing or future digital legislation must be analyzed (and potentially altered) with respect to the metaverse, as has been done in the U.K., to make sure "technology companies can't use the metaverse to escape regulation."⁸³

While no proposed laws that have already been introduced in the U.S. directly address the metaverse, some apply to many or all types of tech platforms and could be used to help protect children or increase transparency in the metaverse.

Perhaps the most effective step lawmakers can take to help reduce the metaverse's current harms and identify future ones is to designate funding for research into the metaverse's effects on young people. In the United States, the [Children and Media Research Advancement Act](#) (CAMRA) would authorize the National Institutes of Health (NIH) to study the health and developmental impacts of all types of digital media on infants, kids, and teens. The [Platform Accountability and Transparency Act](#) (PATA) would force social media companies, many of which will be central players in the metaverse, to hand over data to independent researchers. If passed, these acts would give researchers the means to dive into the cognitive, physical, and social-emotional risks presented in this

⁷⁶ Organizations like Crucible Networks (<https://crucible.network/>) are working toward an open, interoperable metaverse.

⁷⁷ Cyphers, B., & Doctorow, C. (2021). *Privacy without monopoly: Data protection and interoperability*. Electronic Frontier Foundation. <https://www.eff.org/fr/node/104583>.

⁷⁸ Outlaw, J., & Persky, S. (2019). *Industry review boards are needed to protect VR user privacy*. World Economic Forum. <https://www.weforum.org/agenda/2019/08/the-hidden-risk-of-virtual-reality-and-what-to-do-about-it/>.

⁷⁹ Miller, M. R., Herrera, F., Jun, H., Landay, J., & Bailenson, J. (2020). Personal identifiability of user tracking data during observation of 360-degree VR video. *Sci Rep* 10, 17404. <https://doi.org/10.1038/s41598-020-74486-y>.

⁸⁰ Li, C., & Lalani, F. (2022). *How to address digital safety in the metaverse*. World Economic Forum. <https://www.weforum.org/agenda/2022/01/metaverse-risks-challenges-digital-safety/>.

⁸¹ Mitchell, H. (2022). Are virtual worlds safe for children? *Wall Street Journal*. <https://www.wsj.com/articles/are-virtual-worlds-safe-for-children-11645880401>.

⁸² Chee, F. Y. (2022). *EU's Vestager says analysing metaverse ahead of possible regulatory action*. Reuters. <https://www.reuters.com/world/europe/eus-vestager-says-analysing-metaverse-ahead-possible-regulatory-action-2022-02-08/>.

⁸³ Woods, L., & Perrin, W. (2022). *Regulating the future: the Online Safety Bill and the metaverse*. Carnegie UK Trust. <https://www.carnegieuktrust.org.uk/blog-posts/regulating-the-future-the-online-safety-bill-and-the-metaverse/>.

report and provide more conclusive answers to the many urgent, unsettling questions posed by the metaverse. Industry review boards made up of experts, developers, and psychologists could also be created through legislation to survey potential harms and best practices of VR, AR, and metaverse technologies.⁸⁴

The safeguards proposed by the [Kids Internet and Design Safety \(KIDS\) Act](#) could carry over into the metaverse. When applied to the metaverse, the KIDS Act would prevent online platforms from using manipulative design to hook kids or extract their personal information, and would limit their ability to target young users with advertising and algorithms. The audits and transparency reports proposed by the KIDS Act and the [Digital Services Oversight and Safety Act](#) could push companies to demonstrate how services in the metaverse affect children, revealing unintended data use, data-based bias or discrimination, and the amplification of harmful material. Elements of the proposed [Kids Online Safety Act](#) (KOSA)—a duty of care imposed on companies to mitigate a range of harms to minors, and provide tools for parents and minors to protect their data, including opt-out options, independent risk assessments, and strong default privacy settings—could also provide baseline guardrails for young people in the metaverse and demand that companies proactively reduce harmful content.

To protect young users from the privacy risks multiplied by the metaverse's immersive, connected nature, lawmakers should either pass stronger children's privacy laws or comprehensive federal privacy laws for all that require platforms to minimize data collection and obtain informed consent for the data they do acquire. The [Children and Teens' Online Privacy Protection Act](#), also known as "COPPA 2.0," would strengthen protections related to the collection and use of personal data of minors up to age 16 online, including across the metaverse. Additional limits on the collection of nonverbal biometric data for young metaverse users could be enforced. A law could, for example, require companies to automatically delete data of those 16 and under after a defined period.⁸⁵ Again, VR and metaverse companies that are acquired by another should be forced by law to obtain new consent from users before transferring biometric data.⁸⁶ The [Banning Surveillance Advertising Act](#), intended to prohibit advertisers and their facilitators from using personal data to target advertisements, would disincentivize the collection of unnecessary, invasive biometric information from metaverse users.⁸⁷

Mandating that companies set clear, understandable terms-of-service (ToS) agreements will be an important step in making the metaverse safe for kids. The [Terms of Service Labeling, Design, and Readability \(TLDR\) Act](#) would force large platforms to provide concise, nutrition label-style ToS statements. In the metaverse, such labels could state how user data is collected and used, giving users, researchers, and regulators the means to hold companies accountable to their data management and content moderation policies.

Leaders could also design policies to reduce specific offenses that will continue (and become worse) in the metaverse. Some countries, like Canada, Germany, and India, have banned one form of image-based sexual abuse: sharing private pictures without consent.⁸⁸ In the U.K.'s upcoming Online Safety Bill, lawmakers are proposing to strengthen punishments for "cyberflashing," the sending of unsolicited sexual images.⁸⁹

⁸⁴ Outlaw, J., & Persky, S. (2019). *Industry review boards are needed to protect VR user privacy*. World Economic Forum. <https://www.weforum.org/agenda/2019/08/the-hidden-risk-of-virtual-reality-and-what-to-do-about-it/>.

⁸⁵ Ibid.

⁸⁶ Ibid.

⁸⁷ (2022). Eshoo, Schakowsky, Booker introduce bill to ban surveillance advertising. Congresswoman Anna G. Eshoo. [Press release]. <https://eshoo.house.gov/media/press-releases/eshoo-schakowsky-booker-introduce-bill-ban-surveillance-advertising>.

⁸⁸ Li, C., & Lalani, F. (2022). *How to address digital safety in the metaverse*. World Economic Forum. <https://www.weforum.org/agenda/2022/01/metaverse-risks-challenges-digital-safety/>.

⁸⁹ U.K. Department of Digital, Culture, Media & Sport. (2022). *Online safety law to be strengthened to stamp out illegal content*. <https://www.gov.uk/government/news/online-safety-law-to-be-strengthened-to-stamp-out-illegal-content>.

C. What Parents Can Do

Companies may continue to prioritize profits over children, and politicians may be slow to take action in regulating the metaverse, but parents can follow a few steps now to keep kids safe in these new digital spaces.

If kids are entering the metaverse through VR devices, parents should make sure to follow the "Seven Tips to Help You Stay Safe in Virtual Reality" presented in Common Sense's "[VR 101](#)" report. Parents should limit VR time to 20 minutes maximum, have kids sit down while experiencing VR, remove dangerous objects from the room, keep pets in other rooms, have kids take a practice lap in which they touch the room's walls while wearing the headsets, have a non-VR "spotter" in the room, and make sure kids pay attention to safety warnings.⁹⁰

Parents should think about what kind of content they want their children to experience in the metaverse. When curating VR or metaverse content for kids to explore, "parents should consider whether they would want their children to have the same experience in the real world."⁹¹ Breaks between VR sessions are important to minimize eye strain, headaches, and nausea. Creating a designated "playing area" with a thick carpet will give kids a clear reference point to stay somewhat grounded in the real world.⁹²

Whether their kids enter the metaverse through VR or other means, parents should take time to experience it with them. To fully understand the challenges and dangers kids will face in this space, adults need to navigate it themselves. Engaging with the metaverse alongside their kids, parents can teach them how to deal with harmful content or bad actors by blocking others or taking off their headset. They can use applications to "cast" metaverse experiences onto TVs or other devices so the whole family can participate.⁹³ As with any other facet of their kids' lives, parents should engage in conversations with them about the metaverse, asking, for instance, how they spent an afternoon in Roblox. Parents can use this time and these methods to transform the metaverse into a learning opportunity.

Finally, parents can become smart metaverse consumers. Researching product designs and age restrictions will help them find safer devices for their kids. Reading terms-of-service agreements will help them understand how their kids are being tracked, how to increase privacy settings, and how to start teaching their kids about digital citizenship. The [Common Sense Privacy Program](#) reads and summarizes privacy policies (such as the policy of Meta's Oculus devices) to help parents make better choices about the technology they use with their kids. The program analyzes policies, like those of [Meta's Oculus devices](#), through informative ratings on data security, ads and tracking, and parental consent.

Monitoring product and service developments across platforms, like a new feature on VRChat or a new world in Roblox, will allow parents to stay informed about new harms their kids might face. The metaverse is moving quickly, and kids will move with it. It's important for parents to try to keep up.

⁹⁰ Aubrey, J. S., Robb, M. B., Bailey, J., & Bailenson, J. (2018). *Virtual reality 101: What you need to know about kids and VR*, 21. Common Sense. https://www.common sense media.org/sites/default/files/research/report/csm_vr101_final_under5mb.pdf.

⁹¹ Ibid, 4.

⁹² Gordon, W. (2021). How to reduce motion sickness in virtual reality. *Wired*. <https://www.wired.com/story/how-to-reduce-motion-sickness-virtual-reality/>.

⁹³ Crawford, A., & Smith, T. (2022). *Metaverse app allows kids into virtual strip clubs*. BBC News. <https://www.bbc.com/news/technology-60415317>.

More Unresolved Areas

Researchers in psychology, education, communications, sociology, anthropology, and related fields should investigate the harms presented in this report and address a variety of unresolved areas, including:

- The **shaping of children's behavior and self-perceptions** based on positive and negative experiences in VR
- Mitigations and interventions for **addiction, depersonalization, and derealization**
- Interventions for **PTSD** and other negative persistent effects
- **Innovative content and behavioral moderation** techniques
- **Cyberbullying** in the metaverse
- **Countermeasures for sexual abuse**, including methods for detecting online grooming⁹⁴

Broadly, youth experiences in virtual reality and augmented reality are sorely understudied. Additionally, beyond the metaverse, youth beliefs in conspiracies require more research attention.

IV. How to Brave the New Metaverse

Reading through this report, the metaverse may seem like a scary place filled with uncertainty and danger. In many ways, it is. The various psychological harms and privacy risks that have threatened kids on the internet for years may increase in intensity and scope as the metaverse offers more immersive experiences. On a new scale, kids have the potential to be abused by virtual predators, manipulated by trolling avatars, and tracked without consent by profit-seeking platforms. Teens may fall off bridges and crash cars in the real world while buying clothes in the virtual one. Moreover, given the speed of its development and novelty of its content, the metaverse will likely give rise to new, unforeseen risks not even imagined by this report's authors.

But the metaverse will also bring benefits to kids and families in the form of creative education, therapy, and play. While harnessing these positive applications, companies, lawmakers, and parents must create mechanisms to limit the negative consequences for young users and remain vigilant about how metaverse technologies and effects change.

⁹⁴ A survey of technology companies revealed that while most firms are using tools to detect child sexual abuse material (i.e., 87% use image "hash-matching"), only 37% currently use tools to detect online grooming. Setter, C., Greene, N., Newman, N., & Perry, J. (2021). *Global threat assessment 2021*. WeProtect Global Alliance. <https://www.weprotect.org/global-threat-assessment-21/>.

The metaverse is an expanding, unexplored, and largely unregulated digital realm. If the internet is the Wild West, the metaverse is a series of interconnected Wild Wests on new planets across new galaxies: Millions of humans already live on these planets, but their rules have not yet been set. Kids run free, interacting with all forms of people and content. Scientists don't know exactly how being on these planets affects children, but many think it could be even more harmful than the traditional Wild West. Technology companies think it could be even more profitable, and they're investing billions to make it so through the collection and sale of young visitors' sensitive information, their every blink and laugh.

These new planets may function well if given clear structures, laws, and social contracts. They will need rules that put the best interests of users, especially young ones, first and foremost. Companies will need to bake these interests into their designs, and lawmakers will need to pass accountability, transparency, and privacy laws that protect these interests. They will need to do so sooner rather than later. Parents and caregivers reading this report know all too well that their children are already in the metaverse, braving its new worlds alone.